State of Hawaii
DEPARTMENT OF LAND AND NATURAL RESOURCES
Division of Aquatic Resources
Honolulu, Hawaii 96813

May 8, 2009

Board of Land
and Natural Resources
Honolulu, Hawaii

Request for Authorization and Approval to Issue a Papahānaumokuākea Marine National Monument Research Permit to Carl Meyer, University of Hawaii, Hawaii Institute of Marine Biology, for Access to State Waters to Conduct Top Predator Movement Research Activities

The Division of Aquatic Resources (DAR) hereby submits a request for your authorization and approval for issuance of a Papahānaumokuākea Marine National Monument research permit to Carl Meyer, assistant researcher, Hawaii Institute of Marine Biology, pursuant to § 187A-6, Hawaii Revised Statutes (HRS), chapter13-60.5, Hawaii Administrative Rules (HAR), and all other applicable laws and regulations.

The research permit, as described below, would allow entry and activities to occur in the Papahānaumokuākea Marine National Monument (Monument), including the NWHI State Marine Refuge and the waters (0-3 nautical miles) surrounding the following sites:

- Nihoa Island
- Necker Island
- French Frigate Shoals
- Gardner Pinnacles
- Maro Reef
- Laysan Island
- Lisianski Island
- Pearl and Hermes Atoll
- Kure Atoll State Seabird Sanctuary

The activities covered under this permit would occur from June 1, 2009 through October 31, 2009.

The proposed activities are a renewal of work previously permitted and conducted in the Monument.

INTENDED ACTIVITIES

The applicant proposes to equip predatory fishes (ulua, hapu'upu'u, and ono) with electronic tags, and monitor their movements using acoustic receivers (deployed on the sea floor) and satellites.

The purpose of the applicant's research is to provide Monument managers with information on the movements patterns and spawning habitats of three culturally and ecologically important top predators, one of which (hapu'upu'u) is also the only endemic Hawaiian grouper. The research project has the following specific goals and objectives;

1. Download 21 underwater receivers currently stationed in the Monument to retrieve stored movement data from 199 top predators tagged with acoustic transmitters from 2005 through 2008;

2. Determine how widely these animals have ranged since August 2008 and identify their movement patterns;

3. Improve receiver coverage by deploying 6 additional underwater receivers at Maro(2), Pearl and Hermes(1), Laysan(1), and Midway(2);

4. Equip up to 60 additional top predators with acoustic tags detectable by a listening array;

5. Determine the locations of ulua (Caranx ignobilis) spawning aggregation sites.

Activities would be carried out from small boats launched from the NOAA ship HI'IALAKAI. Servicing of receivers would be done by snorkelers and SCUBA divers.

In addition to servicing existing receivers, researchers would create several new temporary receiver moorings using a system that has been demonstrated to successfully withstand seasonal high surf. Moorings would consist of sand screws in areas of soft sediment, and chain around uncolonized substrate in hard bottom areas (live substrates will be avoided). The receivers would be anchored to the moorings and suspended 1-4 m above the ocean floor. The receivers would identify and record the presence of any acoustic transmitters within range (up to 500 m). Researchers would remove these moorings when acoustic monitoring is completed (receivers would be in place for at least 2 years).

The applicant proposes implanting acoustic transmitters into 20 individuals from each of three predator species (hapu'upu'u, ono, ulua), for a total of 60 transmitters. Ono and ulua would be captured by trolling (using an artificial lure) from a small skiff. Captured fishes would be brought alongside the skiff, tail-roped and inverted to initiate tonic immobility for transmitter implantation. SCUBA divers would capture hapu'upu'u by handlining (using a single baited hook) underwater. Captured hapu'upu'u would be restrained on the sea bed in a hand net during tagging procedures. Acoustic transmitters would be implanted into the body cavities of each predator through a small incision in the abdominal wall. The incision would then be sutured closed, the hook removed and the fish released. This entire handling process can be completed in less than 10 minutes. Every fish captured and equipped with an acoustic tag would also receive an external dart tag. Predator handling & tagging activities would be carried out in accordance with the animal use protocols of the University of Hawai'i (protocol #05-053).

The activities proposed by the applicant directly support the Monument Management Plan's priority management needs 3.1 – Understanding and Interpreting the NWHI (through action plan 3.1.1 – Marine Conservation Science).

The activities described above may require the following regulated activities to occur in State waters:

- ☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving monument resource
- ☒ Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
- ☒ Discharging or depositing any material or matter into the Monument
- ☒ Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument
- ☒ Attracting any living Monument resource
- ☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

REVIEW PROCESS:

The permit application was sent out for review and comment to the following scientific and cultural entities: Hawaii Division of Aquatic Resources, Hawaii Division of Forestry and Wildlife, Papahānaumokuākea Marine National Monument (NOAA/NOS), NOAA Pacific Islands Regional Office (NOAA-PIRO), United States Fish and Wildlife Service Hawaiian and Pacific Islands National Wildlife Refuge Complex Office, and the Office of Hawaiian Affairs (OHA). In addition, the permit application has been posted on the Monument Web site since March 11th, giving the public an opportunity to comment. The application was posted within 40 days of its receipt, in accordance with the Monument's Public Notification Policy.

Comments received from the scientific community are summarized as follows:

Scientific reviews support the acceptance of this application.

Concerns raised were:

1. What the minimum size thresholds are for animals that will be tagged

2. If the underwater capture, handling, and surgery on E. quernus pose any threat to divers or captured fish (i.e. from sharks)

Comments received from the Native Hawaiian community are summarized as follows:

Cultural reviews support the acceptance of this application. No concerns were raised.

Comments received from the public are summarized as follows:

No comments were received from the public on this application.

Additional reviews and permit history:

Are there other relevant/necessary permits or environmental reviews that have or will be issued with regard to this project? (e.g. MMPA, ESA, EA) Yes ☒ No ☐
If so, please list or explain:

- The proposed activities are in compliance with the National Environmental Policy Act.

Has Applicant been granted a permit from the State in the past? Yes ☒ No ☐
If so, please summarize past permits:

- The applicant was granted permits DLNR/NWHI/06R003, PMNM-2007-031, and PMNM-2008-027 to conduct similar work in 2006 through 2008.

Have there been any a) violations: Yes ☐ No ☒
b) Late/incomplete post-activity reports: Yes ☐ No ☒

Are there any other relevant concerns from previous permits? Yes ☐ No ☒

RESPONSE:

1. The applicant states that they generally encounter relatively large teleost predators. Based on animals tagged to date, minimum expected sizes are: Epinephelus quernus = 70 cm; Caranx ignobilis = 87 cm; and A. solandri >20kg.

2. The applicant states that they are highly selective when capturing and tagging grouper underwater. They avoid capturing grouper observed in areas with sharks present. Grouper are fully oriented on release and they have not seen any of their released grouper pursued by sharks. In addition, they have encountered the tagged grouper on subsequent dives weeks after release which provides visual evidence of survival.

STAFF OPINION:

DAR staff is of the opinion that Applicant has properly demonstrated valid justifications for his application and should be allowed to enter the NWHI State waters and to conduct the activities therein as specified in the application with the following special instructions and conditions, which are in addition to the Papahānaumokuākea Marine National Monument Research Permit General Conditions. The following special conditions have been vetted through the legal counsel of the Co-Trustee agencies.

1. To prevent introduction of disease or the unintended transport of live organisms, the permittee must comply with the disease and transport protocol attached to this permit.

2. Tenders and small vessels must be equipped with engines that meet EPA emissions requirements.

3. Refueling of tenders and all small vessels must be done at the support ships and outside the confines of lagoons or near-shore waters in the State Marine Refuge

4. No fishing is allowed in State Waters except as authorized under State law for subsistence, traditional and customary practices by Native Hawaiians.

MONUMENT MANAGEMENT BOARD OPINION:

The MMB is of the opinion that the Applicant has met the findings of Presidential Proclamation 8031 and this activity may be conducted subject to completion of all compliance requirements. The MMB concurs with the special conditions recommended by DAR staff.

RECOMMENDATION:

"That the Board authorize and approve, with stated conditions, a Research Permit to Carl Meyer, Hawaii Institute of Marine Biology."

Respectfully submitted,

DAN POLHEMUS
Administrator

APPROVED FOR SUBMITTAL

LAURA H. THIELEN
Chairperson

Papahānaumokuākea Marine National Monument

RESEARCH Permit Application

NOTE: ***This Permit Application (and associated Instructions) are to propose activities to be conducted in the Papahānaumokuākea Marine National Monument. The Co-Trustees are required to determine that issuing the requested permit is compatible with the findings of Presidential Proclamation 8031. Within this Application, provide all information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Papahānaumokuākea Marine National Monument (Monument).***

ADDITIONAL IMPORTANT INFORMATION:

- Any or all of the information within this application may be posted to the Monument website informing the public on projects proposed to occur in the Monument.

- In addition to the permit application, the Applicant must either download the Monument Compliance Information Sheet from the Monument website OR request a hard copy from the Monument Permit Coordinator (contact information below). The Monument Compliance Information Sheet must be submitted to the Monument Permit Coordinator after initial application consultation.

- Issuance of a Monument permit is dependent upon the completion and review of the application and Compliance Information Sheet.

INCOMPLETE APPLICATIONS WILL NOT BE CONSIDERED

Send Permit Applications to:
Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
nwhipermit@noaa.gov
PHONE: (808) 397-2660 FAX: (808) 397-2662

SUBMITTAL VIA ELECTRONIC MAIL IS PREFERRED BUT NOT REQUIRED. FOR ADDITIONAL SUBMITTAL INSTRUCTIONS, SEE THE LAST PAGE.

Papahānaumokuākea Marine National Monument
Permit Application Cover Sheet

This Permit Application Cover Sheet is intended to provide summary information and status to the public on permit applications for activities proposed to be conducted in the Papahānaumokuākea Marine National Monument. While a permit application has been received, it has not been fully reviewed nor approved by the Monument Management Board to date. The Monument permit process also ensures that all environmental reviews are conducted prior to the issuance of a Monument permit.

Summary Information

Applicant Name: Carl Meyer
Affiliation: Hawaii Institute of Marine Biology

Permit Category: Research
Proposed Activity Dates: June 1-October 31 2009
Proposed Method of Entry (Vessel/Plane): Vessel
Proposed Locations: Shallow water habitat (<100m) around all NWHI locations

Estimated number of individuals (including Applicant) to be covered under this permit:
4
Estimated number of days in the Monument: 90

Description of proposed activities: (complete these sentences):

a.) The proposed activity would...
Quantify the movements of ulua (Caranx ignobilis), hapu'upu'u (Epinephelus quernus) and ono (Acanthocybium solandri) to determine (1) whether they move between atolls, (2) how extensively they move within atolls and (3) whether their patterns of movement reveal spawning migrations and habitats.

b.) To accomplish this activity we would ....
Equip predatory fishes with electronic tags, and monitor their movements using acoustic receivers (deployed on the sea floor) and satellites. Fishes (ulua, ono, hapu'upu'u) will be captured using handlines and either tagged alongside a small boat (ulua, ono), or in situ on the sea floor by SCUBA divers (hapu'upu'u). Acoustic receivers are deployed and recovered by SCUBA divers, and listen year-round for predators equipped with acoustic tags.

c.) This activity would help the Monument by ...
Our research will provide Monument managers with information on the movements patterns and spawning habitats of three culturally and ecologically important top predators, one of which (hapu'upu'u) is also the only endemic Hawaiian grouper.

Other information or background: Our research has minimal impact on monument resources. Predators are captured, tagged and released at their capture locations. Our listening stations (acoustic receiver + moorings) are designed to have minimal substrate impact and leave nothing behind when they are removed. We are working with the Office of Hawaiian Affairs to seek guidance on how to mitigate potential cultural impacts associated with our research. Heidi Guth (OHA) previously recommended discussing potential cultural impacts of our proposed research with William Aila. We will be contacting Mr. Aila to discuss these issues.

Section A - Applicant Information

1. Applicant

Name (last, first, middle initial): Meyer, Carl, G.

Title: Assistant Researcher

1a. Intended field Principal Investigator (See instructions for more information):
Carl Meyer (vessel based activities), TBD (Tern Island field station based activities)

2. Mailing address (street/P.O. box, city, state, country, zip): [redacted]

Phone: [redacted]

Fax: [redacted]

Email: [redacted]

For students, major professor's name, telephone and email address: Not Applicable

3. Affiliation (institution/agency/organization directly related to the proposed project):
University of Hawaii, Hawaii Institute of Marine Biology

4. Additional persons to be covered by permit. List all personnel roles and names (if known at time of application) here (e.g. John Doe, Research Diver; Jane Doe, Field Technician):
Yannis Papastamatiou, Research Diver & Field Technician
TBD, Research Diver & Field Technician
TBD, Research Diver & Field Technician
TBD, Research Diver & Field Technician

Section B: Project Information

5a. Project location(s):

		Ocean Based	
☒ Nihoa Island	☐ Land-based	☒ Shallow water	☐ Deep water
☒ Necker Island (Mokumanamana)	☐ Land-based	☒ Shallow water	☐ Deep water
☒ French Frigate Shoals	☒ Land-based	☒ Shallow water	☐ Deep water
☒ Gardner Pinnacles	☐ Land-based	☒ Shallow water	☐ Deep water
☒ Maro Reef			
☒ Laysan Island	☐ Land-based	☒ Shallow water	☐ Deep water
☒ Lisianski Island, Neva Shoal	☐ Land-based	☒ Shallow water	☐ Deep water
☒ Pearl and Hermes Atoll	☐ Land-based	☒ Shallow water	☐ Deep water
☒ Midway Atoll	☐ Land-based	☒ Shallow water	☐ Deep water
☒ Kure Atoll	☐ Land-based	☒ Shallow water	☐ Deep water
☐ Other			

NOTE: There is a fee schedule for people visiting Midway Atoll National Wildlife Refuge via vessel and aircraft.

Location Description:
Fishing/Tagging
Fish capture and tagging will be ship-based and will occur in the shallow waters around FFS, Maro Reef (MAR), Pearl & Hermes Reef (PHR), Midway (MID) and Kure (KUR).

Receiver Deployment and Recovery
In addition to 8 receivers stationed at FFS, a total of 21 other receivers are currently deployed at 8 islands/atolls in the Monument (Appendix 1). Our goal is to service and redeploy these existing receivers to provide continued monitoring coverage within the Monument. We are also requesting additional receiver deployments at Maro (2), PHR (1), Laysan (1) and Midway (2) to augment our listening coverage at these locations to help identify fish spawning habitats. Exact locations of new deployments will be recorded using a handheld GPS.

5b. Check all applicable regulated activities proposed to be conducted in the Monument:
☒ Removing, moving, taking, harvesting, possessing, injuring, disturbing, or damaging any living or nonliving Monument resource
☒ Drilling into, dredging, or otherwise altering the submerged lands other than by anchoring a vessel; or constructing, placing, or abandoning any structure, material, or other matter on the submerged lands
☒ Anchoring a vessel
☐ Deserting a vessel aground, at anchor, or adrift
☒ Discharging or depositing any material or matter into the Monument
☐ Touching coral, living or dead
☒ Possessing fishing gear except when stowed and not available for immediate use during passage without interruption through the Monument

☒ Attracting any living Monument resource
☐ Sustenance fishing (Federal waters only, outside of Special Preservation Areas, Ecological Reserves and Special Management Areas)
☐ Subsistence fishing (State waters only)
☒ Swimming, snorkeling, or closed or open circuit SCUBA diving within any Special Preservation Area or Midway Atoll Special Management Area

6 Purpose/Need/Scope ***State purpose of proposed activities:***

(a) Purpose of proposed activities
The purpose of this research is to provide managers with empirical data on top predator movement patterns and spawning habitats in Monument waters. This information is needed for selecting appropriate management strategies for these culturally and ecologically important fishes. We have the following specific goals and objectives;

1. Download 21 underwater receivers currently stationed in the Monument to retrieve stored movement data from 199 top predators tagged with acoustic transmitters from 2005 to 2008.

2. Determine how widely these animals have ranged since August 2008 and identify their patterns of movement.

3. Improve our receiver coverage by deploying 6 additional underwater receivers at , Maro (2), PHR (1), Laysan (1) and Midway (2).

4. Equip up to 60 additional top predators with acoustic tags detectable by our listening array. These tag deployments will enable us to obtain the first insights into ono movements in Monument waters, and to enhance our understanding of ulua and hapu'upu'u movements in the NWHI.

5. Determine the locations of ulua (Caranx ignobilis) spawning aggregation sites.

(b) Need for proposed activities
Top predators play an important role in many ecosystems and in Monument waters this role is filled by sharks (primarily tiger, galapagos, gray reef and whitetip reef sharks) and large teleost fishes (primarily ulua) (DeCrosta 1981, Wetherbee et al. 1997, Friedlander & DeMartini 2002, Holzwarth et al. 2006). Previous NWHI studies have quantified top predator age and growth (Parrish et al. 1980, DeCrosta 1981, Sudekum et al. 1991,), reproduction (Parrish et al. 1980, Sudekum et al. 1991, Wetherbee et al. 1997), diet and trophic interactions (Sudekum et al. 1991, Wetherbee et al. 1997), and spatial distribution and density (Wetherbee et al. 1997, Friedlander & DeMartini 2002, DeMartini et al. 2005, Holzwarth et al. 2006). The movement patterns of top predators in the NWHI have received far less attention with previous scientific studies limited to short-term (<48h) acoustic tracks of 3 tiger sharks at French Frigate Shoals (Tricas 1981, Lowe et al. 2006) and longer term acoustic monitoring of tiger sharks (N=14), galapagos sharks (N=10) and ulua (N=3) at French Frigate Shoals and Midway.

Science-based management of the marine top predators of the Hawaiian archipelago requires that we know whether key species are site-attached to specific areas or, if not, how frequent and extensive are their movements. We are currently quantifying top predator movements in the Monument, and addressing three questions relevant to management zoning; (1) Do top predators move across open ocean between atolls?, (2) How extensive are their intra-atoll movements?, and (3) Do top predators exhibit predictable patterns of movement and habitat

use? Since 2005 we have equipped 199 top predators (7 species) with surgically-implanted acoustic transmitters and monitored their subsequent movements using 29 underwater receivers stationed on the seabed at 9 atolls and islands within the Monument. In 2006 we also equipped 9 sharks (5 tiger sharks and 4 galapagos sharks) with satellite transmitters to monitor their movements in locations not equipped with acoustic receivers. Using these technologies we found that tiger sharks routinely swim between atolls, range along the entire Hawaiian archipelago and venture hundreds of miles beyond Monument boundaries into open-ocean. We also obtained the first empirical evidence that gray reef sharks swim across open-ocean between atolls. Other top predator species were site-attached to individual atolls, but wide-ranging within their 'home' atoll (e.g., Meyer et al., 2007a,b). We discovered that ulua & uku have predictable patterns of movement, including diel habitat shifts and tidal & lunar rhythmicity (Meyer et al., 2007a,b). We also found that during summer full moons, ulua from all over French Frigate Shoals atoll converge on one particular location where they form large spawning aggregations (Meyer et al., 2007a).

Although we have already made substantial progress in quantifying predator movement patterns in Monument waters, important questions remain unanswered. For example, we still know very little about the movement patterns of several top predators that are abundant in Monument waters (e.g., ono, hapu'upu'u). We also need to determine how documented movement patterns (e.g., ulua spawning migrations) vary over longer time scales and where predators go to spawn at each atoll. We need to identify spawning sites because these may be critical habitats for top predators.

(c) Scope of proposed activities
We propose to continue monitoring our existing transmitter-equipped predators in order to determine how their movement patterns vary over multi year time-scales. This will require servicing and redeploying 21 receivers already stationed in Monument waters (see Appendix 1). We also propose deploying six additional underwater receivers in Monument waters in order to improve our monitoring coverage at Maro (2), PHR (1), Laysan (1) and Midway (2). We propose implanting acoustic transmitters into 20 individuals from each of three predator species (hapu'upu'u, ono, ulua). These tag deployments will enable us to obtain the first insights into ono movements in Monument waters, and to enhance our understanding of ulua and hapu'upu'u movements in the NWHI. Thus we are requesting up to 60 acoustic transmitter deployments (all species combined).

7. Answer the Findings below by providing information that you believe will assist the Co-Trustees in determining how your proposed activities are compatible with the conservation and management of the natural, historic, and cultural resources of the Monument:

The Findings are as follows:

a. How can the activity be conducted with adequate safeguards for the cultural, natural and historic resources and ecological integrity of the Monument?
The activity will be conducted with adequate safeguards for the resources and ecological integrity of the Monument. We use non-lethal catch and release, and acoustic monitoring

techniques that have minimal impact on the resources and ecological integrity of the Monument. This project is a continuing effort to quantify top predator movements throughout the NWHI for the purpose of informing management. We are working with the Office of Hawaiian Affairs to seek guidance on how to mitigate potential cultural impacts associated with our research.

b. How will the activity be conducted in a manner compatible with the management direction of this proclamation, considering the extent to which the conduct of the activity may diminish or enhance Monument cultural, natural and historic resources, qualities, and ecological integrity, any indirect, secondary, or cumulative effects of the activity, and the duration of such effects?
The proposed activities will have minimal impact on the resources of the region. The research consists of non-lethal catch and release, and acoustic monitoring. This research is being conducted in concert with the priorities listed in the current draft NOAA research plan for the Monument. We are working with the Office of Hawaiian Affairs to seek guidance on how to mitigate potential cultural impacts associated with our research.

c. Is there a practicable alternative to conducting the activity within the Monument? If not, explain why your activities must be conducted in the Monument.
There is no practicable alternative to conducting activities in the Monument. We are addressing questions that are directly relevant to management of Monument resources (we are quantifying movement patterns of top predators throughout the Monument), hence the study must be carried out within the Monument.

d. How does the end value of the activity outweigh its adverse impacts on Monument cultural, natural and historic resources, qualities, and ecological integrity?
The management value of data produced by our research activities outweighs the minor, transient impacts on Monument resources. The methods and procedures that we are proposing will have minimal impacts on Monument resources, qualities, and ecological integrity. No animals will be removed from the Monument and we have empirical data showing that tagged predators resume normal patterns of behavior within hours of release (e.g., Meyer et. al. 2007a,b). Our receivers are stationed on uncolonized habitats, and removal will leave no evidence of their presence (see Appendix 2). We are working with the Office of Hawaiian Affairs to seek guidance on how to mitigate potential cultural impacts associated with our research

e. Explain how the duration of the activity is no longer than necessary to achieve its stated purpose.
The actual fieldwork component of this research involves the minimum time required to reach the desired sample size of tagged fishes based on historical catch rates. The monitoring of predator movements is done remotely using small receivers left in situ year-round. The multi-year overall time frame of our proposed activities is consistent with our objectives of quantifying long-term movement patterns of predators in Monument waters. Long-term studies are essential for identifying seasonal movements and determining how movement patterns vary over multi year time-scales.

f. Provide information demonstrating that you are qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.

The principle investigator has more than 15 years of experience conducting this type of research (see attached CV for details) and is well qualified to conduct and complete the activity and mitigate any potential impacts resulting from its conduct. All personnel included in this permit application have extensive experience conducting research in the Monument, and in acoustic monitoring techniques. This is a continuance of a multi-year project. We are working with the Office of Hawaiian Affairs to seek guidance on how to mitigate potential cultural impacts associated with our research.

g. Provide information demonstrating that you have adequate financial resources available to conduct and complete the activity and mitigate any potential impacts resulting from its conduct.
Our research is supported by an award to Hawaii Institute of Marine Biology from the National Marine Sanctuary Program (MOA 2005-008/6882), and we are provided access to the Monument on NOAA research vessels. These resources are adequate to conduct and complete the proposed activities and mitigate any potential impacts resulting from its conduct.

h. Explain how your methods and procedures are appropriate to achieve the proposed activity's goals in relation to their impacts to Monument cultural, natural and historic resources, qualities, and ecological integrity.
The methods and procedures that we are proposing are ideal for achieving our goals with minimal impacts to Monument resources, qualities, and ecological integrity. The use of passive monitoring techniques (self-contained acoustic receivers) means that we need relatively little human access to the Monument in order to achieve continuous, year-round monitoring of predator movements. No top predators will be removed from the Monument as a result of our research, and we have empirical data showing that tagged predators resume normal patterns of behavior within hours of release (e.g., Meyer et. al. 2007a,b). Our receivers are stationed on uncolonized habitats, and removal will leave no evidence of their presence (see Appendix 2). We are working with the Office of Hawaiian Affairs to seek guidance on how to mitigate potential cultural impacts associated with our research.

i. Has your vessel has been outfitted with a mobile transceiver unit approved by OLE and complies with the requirements of Presidential Proclamation 8031?
NOAA vessels are equipped with the NOAA OLE Vessel Monitoring System

j. Demonstrate that there are no other factors that would make the issuance of a permit for the activity inappropriate.
There are no other factors that would make the issuance of a permit for the activity inappropriate.

8. Procedures/Methods:

Activities will be carried out from small boats launched from NOAA vessel Hi'ialakai and will not require any terrestrial access. Servicing of receivers will be done by snorkelers and SCUBA divers. Our chosen method (remote acoustic monitoring) is ideal for quantifying animal movements in remote, environmentally-sensitive locations because it has minimal environmental

impact and requires only occasional, brief access by researchers to individual study sites, yet provides continuous monitoring of animal movements at those sites.

(a) Deployment of underwater receivers (see also Appendix 2)
We will create temporary receiver moorings using a system that has previously been empirically demonstrated to successfully withstand seasonal high surf. Moorings will consist of sand screws in areas of soft sediment, and chain around uncolonized substrate in hard bottom areas (live substrates will be avoided). We will remove these moorings when acoustic monitoring is completed (receivers will be in place for at least 2 years). The receivers will be anchored to the moorings and suspended 1-4 m above the ocean floor. The receivers will identify and record the presence of any acoustic transmitters within range (up to 500 m). The transmitter number, time of arrival and departure and the date will be recorded and stored until the data are downloaded from the receivers to a computer. The receivers have a battery life of approximately 15 months and will be serviced at 6 to 12 month intervals.

(b) Data retrieval, reduction and analysis.
We will download receivers currently deployed in Monument waters(Appendix 1). Data downloading consists of interfacing the receiver to a computer via a magnetically coupled probe and the serial port of the computer, and can be accomplished in the field. Preliminary data reduction and analyses will commence after downloading.

(c) Deployment of transmitters
We will implant acoustic transmitters into up to 20 ono, 20 hapu'upu'u and 20 ulua captured at FFS, Maro, PHR, Midway and Kure. Our predator handling & tagging activities will be carried out in accordance with the animal use protocols of the University of Hawaii (protocol #05-053). Ono and ulua will be captured by trolling (using an artificial lure) from a small skiff. Captured fishes will be brought alongside the skiff, tail-roped and inverted to initiate tonic immobility for transmitter implantation. SCUBA divers will capture hapu'upu'u by handlining (using a single baited hook) underwater. Captured hapu'upu'u will be restrained on the sea bed in a hand net during tagging procedures. We will implant coded acoustic transmitters (V16, 9 mm diameter, 90 mm long, Vemco, Halifax, Nova Scotia) into the body cavities of each predator through a small incision in the abdominal wall (Holland et al., 1999; Meyer & Honebrink 2005, Meyer et al. 2007a,b). The incision will then be sutured closed, the hook removed and the fish released. This entire handling process can be completed in less than 10 minutes. Every fish captured and equipped with an acoustic tag will also receive an external dart tag.

Previous reviews of the above capture procedures have prompted a series of questions about potential impacts on other species. To provide additional information we have included these questions and our responses;

1. What kind of by-catch is likely to occur?

By-catch includes reef-associated piscivores attracted to artificial lures, primarily uku (Aprion virescens), omilu (Caranx melampyus), kawa kawa (Euthynnus affinis) and kahala (Seriola dumerili).

2. How can by-catch be minimized or mitigated?

Non-target fishes captured by trolling are immediately released alongside the boat without removing them from the water. If by-catch becomes more than occasional then trolling is ceased in that area.

3. Are lines an entanglement hazard for seals? What mitigation measures are taken?

No. Handlines (baited and trolled) are manned constantly. We have not been approached by seals while using these methods.

4. Has there been any seabird interaction with the fishing gear?

Seabirds are sporadically attracted by trolling activities. Fishing is ceased and lines retrieved whenever birds show interest in the fishing gear. By taking these precautions we have avoided any physical interactions between birds and trolling gear.

Cited References

Antonelis, G. A., J. D. Baker, T. C. Johanos, A. L. Harting, 2006. Abundance of the Hawaiian Monk Seal (Monachus schauinslandi): status and conservation issues. Atoll Research Bulletin 543:75-101.

Caretta, J. V., K. A. Forney, M. M. Muto, J. Barlow, J. Baker, B. Hanson, and M. Lowry. 2007. U.S. Pacific Marine Mammal Stock Assessment: 2006 NOAA-TMNMFS-SWFSC-398.

DeCrosta MA (1981). Age determination and growth of three species of shallow-water carcharhinid sharks in Hawaii. Pacific Science 35:266-267.
Harting, A. L., J. D. Baker, and T. C. Johanos. 2007. Reproductive patterns of the Hawaiian monk seal. Marine Mammal Science 23:553-573.

Holland KN, Wetherbee BM, Lowe CG and CG Meyer (1999) Movements of tiger sharks (Galeocerdo cuvier) in coastal Hawaiian waters. Marine Biology 134: 665-673.

Holzwarth SR, DeMartini EE, Zgliczynski BJ, Laughlin JL (2006) Sharks and jacks in the Northwestern Hawaiian Islands from towed-diver surveys 2000-2003. Atoll Research Bulletin 543: 257-280.

Friedlander AM and EE DeMartini (2002). Contrasts in density, size, and biomass of reef fishes between the northwestern and the main Hawaiian islands: the effects of fishing down apex predators. Marine Ecology Progress Series 230:253-264.

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Meyer CG, Papastamatiou YP, Holland KN. 2007b. Seasonal, diel and tidal movements of green jobfish (Aprion virescens, Lutjanidae) at remote Hawaiian atolls: Implications for Marine Protected Area design. Marine Biology. 151: 2133-2143.

Parrish J, Taylor L, DeCrosta M, Feldkamp S, Sanderson L and C Sorden (1980). Symposium on Status of Resource Investigations in the Northwestern Hawaiian Islands. pp. 175-188.

Sudekum AE, Parrish JD, Radtke RL and S Ralston (1991). Life history and ecology of large jacks in undisturbed, shallow, oceanic communities. Fishery Bulletin 89: 493-513.

Tricas TC, Taylor LR and G Naftel. (1981). Diel behavior of the tiger shark, Galeocerdo cuvier, at French Frigate Shoals, Hawaiian Islands. Copeia 1981:904-908.

Wetherbee BM, Crow GL and CG Lowe (1997). Distribution, reproduction and diet of the gray reef shark Carcharhinus amblyrhynchos in Hawaii. Marine Ecology Progress Series 151: 181-189..

NOTE: If land or marine archeological activities are involved, contact the Monument Permit Coordinator at the address on the general application form before proceeding, as a customized application will be needed. For more information, contact the Monument office on the first page of this application.

9a. Collection of specimens - collecting activities (would apply to any activity): organisms or objects (List of species, if applicable, attach additional sheets if necessary):

Common name:
N/A

Scientific name:
N/A

& size of specimens:

N/A

Collection location:
N/A

☐ Whole Organism ☐ Partial Organism

9b. What will be done with the specimens after the project has ended?
N/A

9c. Will the organisms be kept alive after collection? ☐ Yes ☐ No
N/A

• General site/location for collections:
N/A

• Is it an open or closed system? ☐ Open ☐ Closed
N/A

• Is there an outfall? ☐ Yes ☐ No
N/A

• Will these organisms be housed with other organisms? If so, what are the other organisms?
N/A

• Will organisms be released?
N/A

10. If applicable, how will the collected samples or specimens be transported out of the Monument?
N/A

11. Describe collaborative activities to share samples, reduce duplicative sampling, or duplicative research:
N/A

12a. List all specialized gear and materials to be used in this activity:
Please refer to Appendix 3

12b. List all Hazardous Materials you propose to take to and use within the Monument:
N/A

13. Describe any fixed installations and instrumentation proposed to be set in the Monument:
Please refer to Appendix 2

14. Provide a time line for sample analysis, data analysis, write-up and publication of information:
Analyses & interpretation of data are ongoing. We already have two manuscripts published in international peer-reviewed journals. We have a 3rd manuscript currently in press. We anticipate completion of a report on shark spatial dynamics at FFS by December 2010.

15. List all Applicants' publications directly related to the proposed project:
Meyer CG, Papastamatiou YP, Holland KN. 2007. Seasonal, diel and tidal movements of green jobfish (Aprion virescens, Lutjanidae) at remote Hawaiian atolls: Implications for Marine Protected Area design. Marine Biology. 151: 2133-2143.

Meyer CG, Holland KN, Papastamatiou YP. 2007. Seasonal and diel movements of giant trevally (Caranx ignobilis) at remote Hawaiian atolls: implications for the design of Marine Protected Areas. Marine Ecology Progress Series. 333: 13-25.

Meyer CG, Clark TB, Papastamatiou YP, Whitney NM, Holland KN. In Press. Long-term movements of tiger sharks (Galeocerdo cuvier) in Hawaii. Marine Ecology Progress Series.

With knowledge of the penalties for false or incomplete statements, as provided by 18 U.S.C. 1001, and for perjury, as provided by 18 U.S.C. 1621, I hereby certify to the best of my abilities under penalty of perjury of that the information I have provided on this application form is true and correct. I agree that the Co-Trustees may post this application in its entirety on the Internet. I understand that the Co-Trustees will consider deleting all information that I have identified as "confidential" prior to posting the application.

Signature Date

SEND ONE SIGNED APPLICATION VIA MAIL TO THE MONUMENT OFFICE BELOW:

Papahānaumokuākea Marine National Monument Permit Coordinator
6600 Kalaniana'ole Hwy. # 300
Honolulu, HI 96825
FAX: (808) 397-2662

DID YOU INCLUDE THESE?

☒ Applicant CV/Resume/Biography
☐ Intended field Principal Investigator CV/Resume/Biography
☒ Electronic and Hard Copy of Application with Signature
☐ Statement of information you wish to be kept confidential
☐ Material Safety Data Sheets for Hazardous Materials

Carl Meyer – Papahanaumokuakea Predator Tagging

Appendix 1 - Activity Locations

(1) We will recover, download and redeploy 21 receivers deployed at the following locations;

Atoll	Location	Latitude	Longitude	Depth (ft)	Habitat
Nihoa	W Side	23.05985	-161.93477	98	UHB*
Gardner	West Cove	24.99834	-167.99982	51	UHB
Maro	North Tip	25.45842	-170.67104	55	Sand
Maro	Shark Point	25.46057	-170.68168	65	Sand
Laysan	South End	25.75463	-171.71562	66	Sand
Laysan	W Cove Channel	25.77395	-171.74248	30	Sand
Lisianski	S Neva Shoals	25.88237	-173.91573	85	UHB
Lisianski	E Side of Island	26.05728	-173.95957	14	Sand
PHR	SW Corner	27.75290	-175.94805	50	UHB
PHR	SE Channel	27.78702	-175.83623	30	UHB
PHR	Main Channel	27.79092	-175.86300	35	UHB
PHR	W Spur & Groove	27.80215	-176.01095	100	Sand
PHR	NE Side	27.90115	-175.72205	65	UHB
PHR	NW Side	27.91095	-175.90890	85	UHB
Midway	Frigate Point	28.19117	-177.39450	30	UHB
Midway	Fish Hole	28.19742	-177.36272	40	UHB
Kure	SE Channel	28.38183	-178.30860	60	UHB
Kure	West Channel	28.38897	-178.36187	70	UHB
Kure	S Barrier Reef	28.40388	-178.37508	40	Sand
Kure	E Barrier Reef	28.42502	-178.28172	74	Sand
Kure	N Barrier Reef	28.46045	-178.32629	73	UHB

*UHB = Uncolonized hard bottom

Appendix 2 Receiver installations in the Monument

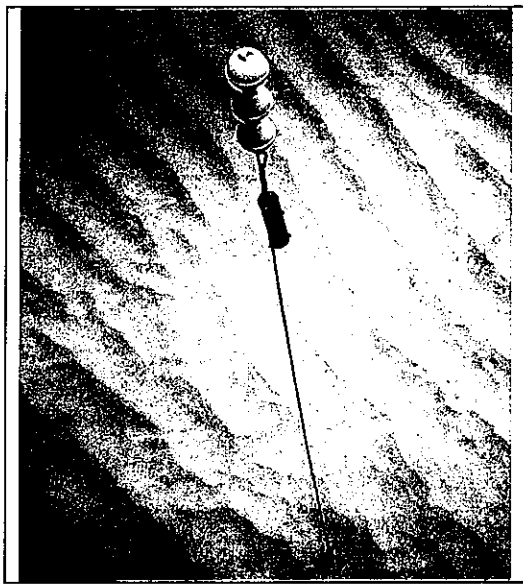
We use Vemco VR2 underwater receivers for monitoring movements of transmitter-equipped predators. The VR2 consists of a hydrophone, receiver, ID detector, data logging memory, and battery all housed in a submersible plastic case.

Vemco VR2 Receiver

Each receiver is mounted on a mooring consisting of an anchor (either a sand screw, or chain around uncolonized hard substrate), rope bridle and subsurface floats.

	We use 4 ft steel sand screws which are literally screwed into the sand, leaving an eye loop exposed. This is the point of attachment for the rope bridle.
	Anti-chafing gear (heavy duty hose) protects the rope bridle at point of contact with the sand screw eye loop. We splice the rope bridle to the sand screw *in situ*.

Carl Meyer – Papahanaumokuakea Predator Tagging



The finished installation, consisting of sand screw, rope bridle, VR2 receiver and subsurface floats.

We use the sand screw installation whenever possible. In hard-bottom areas we use chain around natural arches in lieu of sand screws (the other components are identical).

We service these installations every 6-12 months, at which time we completely replace all mooring components (anchors, rope bridles, floats), and download and re-battery the receivers.

We plan to maintain these installations for the duration of the acoustic monitoring research (at least 2 years). We will remove these installations on completion of the research. Removal is straightforward, takes less than 10 minutes per installation and leaves nothing behind.

Carl Meyer – Papahanaumokuakea Predator Tagging

Appendix 3 Itemized list of gear and materials

Diving gear (will be transported in and out of Monument)

3 BCDs
3 Regulators
2 Weightbelts
6 Pairs of fins
8 Masks
4 Snorkels
2 Dive computers
2 Wetsuits
3 Dive knives
2 Surface floats and reels
2 Mesh bags

Fishing gear (will be transported in and out of Monument)

4 Handlines and lures
3 Ten hook shark lines
3 Bait knives
1 Chopping board
6 Large surface buoys
1 large hand net
Frozen bait (tuna heads)

Bait Storage (will be transported in and out of Monument)
3 chest freezers
Generator to power chest freezers (if power requirements exceed Tern Island photovoltaic capabilities).

Telemetry equipment (will be deployed in Monument waters)

60 V16 acoustic transmitters (will be surgically implanted in predators)
6 acoustic receivers (will be deployed on seabed)
Mooring supplies for acoustic receivers (see Appendix 2)

Small boat (source TBD, will be transported in and out of Monument)
A small boat (up to 19ft) will be used for fieldwork activities

Miscellaneous items (will be transported in and out of Monument)

2 Laptop computers
2 Computer-receiver interfaces
Various rope working tools (fids, tape, rope cutter)
Receiver servicing supplies (batteries, electrical tape, scrubbing brushes)

Papahānaumokuākea Marine National Monument
Compliance Information Sheet

1. Updated list of personnel to be covered by permit. List all personnel names and their roles here (e.g. John Doe, Diver; Jane Doe, Field Technician, Jerry Doe, Medical Assistant):

Carl (Field PI), HIMB

Simon Bossy (Field Technician), HIMB/FMR

TBD (Field Technician), HIMB

TBD (Field Technician), HIMB

2. Specific Site Location(s): (Attach copies of specific collection locations): Waters <300m depth in and around NWHI locations.

(1) We will recover, download and redeploy up to 21 receivers deployed at the following locations;

Atoll	Location	Latitude	Longitude	Depth (ft)	Habitat
Nihoa	W Side	23.05985	-161.93477	98	UHB*
Gardner	West Cove	24.99834	-167.99982	51	UHB
Maro	North Tip	25.45842	-170.67104	55	Sand
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Kure	S Barrier Reef	28.40388	-178.37508	40	Sand

Kure	E Barrier Reef	28.42502	-178.28172	74	Sand
Kure	N Barrier Reef	28.46045	-178.32629	73	UHB

*UHB = Uncolonized hard bottom

We are also requesting 6 additional receiver deployments at Maro (2), PHR (1), Laysan (1) and Midway (2) to augment our listening coverage at these locations to help identify fish spawning habitats. Exact locations of new deployments will be recorded using a handheld GPS.

Fish capture and tagging will be ship-based and will occur in waters around FFS, Laysan, Maro Reef (MAR), Pearl & Hermes Reef (PHR), Midway (MID) and Kure (KUR).

3. Other permits (list and attach documentation of all other related Federal or State permits):

I have a permit pending for related shark research at French Frigate Shoals atoll

3a. For each of the permits listed, identify any permit violations or any permit that was suspended, amended, modified or revoked for cause. Explain the circumstances surrounding the violation or permit suspension, amendment, modification or revocation.

Not Applicable

4. Funding sources (Attach copies of your budget, specific to proposed activities under this permit and include funding sources. See instructions for more information):

Transport (ship): NOAA is providing transportation for field personnel from Honolulu to locations within Papahanaumokuakea on NOAA ship Hiialakai.

Accommodation: NOAA is providing accommodation for field personnel from within Papahanaumokuakea on NOAA ship Hiialakai.

Small boat for field ops: NOAA is providing ship-based skiffs for field operations within Papahanaumokuakea.

Fieldwork supplies: Funds for telemetry and fishing supplies will be provided by HIMB under an MOA with NOAA.

5. Time frame:
Activity start: **June 2009**
Activity completion: **September 2011**

Dates actively inside the Monument:
From: **June 11, 2009**
To: **July 3, 2009**

2nd cruise during August 2009

Describe any limiting factors in declaring specific dates of the proposed activity at the time of application: **Cruise dates need to be finalized.**

Personnel schedule in the Monument:

DATE	PORT	Departure time	Distance
6/09/09	Depart Pearl Harbor	0900 hrs	500nm to FFS @9.5 kts ~ 53hrs
6/10/09	Transit	Transit	
6/11/09	Transit	Arrive FFS- half day of ops	
6/12/09	FFS	Full Day	
6/13/09	FFS	Full Day	
6/14/09	FFS	Full Day Depart Maro 1830	257nm to Maro @9.5 kts ~ 27hrs
6/15/09	Transit	Arrive Maro pm	
6/16/09	Maro	Full Day	
6/17/09	Maro	Full Day depart 1830	317nm to P&H @ 9.5 kts ~33hrs
6/18/09	Transit	Arrive P&H pm	
6/19/09	P&H	Full Day	
6/20/09	P&H	Full Day	
6/21/09	P&H	Full Day depart 1830 to Midway	85nm to Midway @ 9.5 kts ~9hrs
6/22/09	Midway	Arrive Midway-full day ops	
6/23/09	Midway	Full Day	
6/24/09	Midway	Full Day	
6/25/09	Midway	Full Day	
6/26/09	Midway	Half Day depart 1200 to Laysan	336nm to Laysan @9kts~37 hrs
6/27/09	Transit	Transit	
6/28/09	Laysan	Arrive Laysan full day day	
6/29/09	Laysan	Full day depart 1830 HNL	804nm to HNL @9 kts ~ 89hrs
6/30/09	Transit	Transit	
7/01/09	Transit	Transit	
7/02/09	Transit	Transit	
7/03/09	Arrive Pearl Harbor ~1000		

August cruise itinerary TBD

6. Indicate (with attached documentation) what insurance policies, bonding coverage, and/or financial resources are in place to pay for or reimburse the Monument trustees for the necessary search and rescue, evacuation, and/or removal of any or all persons covered by the permit from the Monument:

7. Check the appropriate box to indicate how personnel will enter the Monument:

☒ Vessel
☐ Aircraft

Provide Vessel and Aircraft information:

NOAA ship Hiialakai

8. The certifications/inspections (below) must be completed prior to departure for vessels (and associated tenders) entering the Monument. Fill in scheduled date (attach documentation):

☐ Rodent free, Date: **TBD**
☐ Tender vessel, Date: **TBD**
☐ Ballast water, Date: **TBD**
☐ Gear/equipment, Date: **TBD**
☐ Hull inspection, Date: **TBD**

9. Vessel information (NOTE: if you are traveling aboard a National Oceanic and Atmospheric Administration vessel, skip this question):
Vessel name:
Vessel owner:
Captain's name:
IMO#:
Vessel ID#:
Flag:
Vessel type:
Call sign:
Embarkation port:
Last port vessel will have been at prior to this embarkation:
Length:
Gross tonnage:
Total ballast water capacity volume (m3):
Total number of ballast water tanks on ship:
Total fuel capacity:
Total number of fuel tanks on ship:
Marine Sanitation Device:
Type:

Explain in detail how you will comply with the regulations regarding discharge in the Monument. Describe in detail. If applicable, attach schematics of the vessel's discharge and treatment systems:

Other fuel/hazardous materials to be carried on board and amounts:

Provide proof of a National Oceanic and Atmospheric Administration (NOAA) Office of Law Enforcement-approved Vessel Monitoring System (VMS). Provide the name and contact information of the contractor responsible for installing the VMS system. Also describe VMS unit name and type:

VMS Email:
Inmarsat ID#:

10. Tender information:

On what workboats (tenders) will personnel, gear and materials be transported within the Monument? List the number of tenders/skiffs aboard and specific types of motors:

NOAA ship Hiialakai carries up to 6 skiffs, 2 have inboard diesel engines, the remainder have 4-stroke outboard gasoline engines

Additional Information for Land Based Operations

11. Proposed movement of personnel, gear, materials, and, if applicable, samples:

We will resupply a field team based at Tern Island with frozen bait and telemetry supplies during the June visit to FFS. This will consist of moving articles from the ship to the dock at Tern Island where they will be handled by field station personnel.

12. Room and board requirements on island:

Not applicable

13. Work space needs:

Not applicable

DID YOU INCLUDE THESE?
☒ Map(s) or GPS point(s) of Project Location(s), if applicable
☐ Funding Proposal(s)
☐ Funding and Award Documentation, if already received
☐ Documentation of Insurance, if already received
☐ Documentation of Inspections
☐ Documentation of all required Federal and State Permits or applications for permits